CHAPTER 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Introduction

Chapter 2: Alternatives including the Proposed Action are described in this chapter of the EA. The chapter has the following five major sections:

- Description of Alternatives
- Alternatives Eliminated From Detailed Study
- Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line
- Project and Siting Alternatives
- Identification of the Preferred Route Segment

2.2. Description of Alternatives

2.2.1. Alternative 1 – Do Not Build Additional Transmission Line (No Action)

Under this alternative, TVA would not construct a new transmission line. MTEMC would continue at the current transmission capabilities with a maximum loading of 70 megawatts (MW) to serve its customers. With current growth projections, not providing a new transmission line would result in an overloading of the MTEMC system in western Williamson County. The increasing load due to ongoing and already planned development would not be met, and system outages, especially at times of high electricity use, could occur as early as 2004. To reduce these reliability issues in January 2004, MTEMC announced plans to implement a freeze on new electricity service requests based on system loading, which would, thereby stop additional residential, commercial, and industrial growth and reduce the system outage risk. If TVA decides not to build the proposed transmission line, MTEMC could decide to build the transmission line itself. Should this occur, the resulting impacts would likely be similar to those described in this EA. MTEMC could also decide to employ the kind of stopgap measures described in Section 2.3.1 below.

2.2.2. Alternative 2 – Construct Transmission Line

TVA would construct a new 161-kV transmission line to serve a new substation being built by MTEMC. The new transmission line would connect into the TVA system at one of four points: TVA's Davidson, Tennessee, 500-kV Substation; MTEMC's Aspen Grove 161-kV Substation; a tap connection to TVA's Maury-Radnor 161-kV Transmission Line; or a tap connection to TVA's Davidson-Centerville 161-kV Transmission Line (Figure 1-1). This alternative would meet the need to relieve overloading and reliability concerns in the area near Highway 96 on the west side of Franklin and, depending on the connection point selection and transmission line routing, provide an opportunity to serve additional projected load increases in western Williamson County. This alternative would require the purchase and clearing of new transmission line right-of-way for a distance ranging from approximately 4 to 16 miles depending on the final route option.

2.3. Alternatives Eliminated from Further Study

2.3.1. Distribution System Upgrades

Under this alternative, MTEMC would increase the transformer capacity at its existing substations that serve the western part of Williamson County and would build at least five additional lower voltage circuits from these substations into the area under study. These transmission lines would be built on new rights-of-way wherever available, typically 40 feet in width, to achieve system reliability. The mileage required is estimated to be between 45 to 50 miles. Where rights-of-way were not available, existing transmission lines would require double or triple circuits, which would decrease the reliability. The large number of transmission line miles at lower voltages would result in a less efficient system for supplying electricity to western Williamson County than would Alternative 2, with more energy lost in transmission line losses, i.e., conductor heating. This alternative was considered unreasonable and eliminated from further study because it would cost almost twice as much as Alternative 2 and would not meet other objectives of TVA's proposed action, including increasing reliability.

2.3.2. Load Reduction and/or Conservation

MTEMC and TVA have estimated that for the area under study on the western edge of Franklin and farther west along Highway 96 in western Williamson County, the service area needs will be 62.1 MW above firm capability in 2004. TVA currently operates an energy conservation program, which TVA and the distributors cooperatively promote and expand. Energy efficiency initiatives throughout the MTEMC service area have resulted in a 21.1 MW reduction from October 1998 through December 2002. These initiatives include TVA *energy right*® installations, the Direct Load Control Program and In Concert With the Environment (Appendix III).

Due to the rapid growth in electricity demand and the planned increases for new homes in the area west of Franklin and in western Williamson County, it does not appear that current conservation efforts would be sufficient to offset the projected 2004 deficit. At the current rate of implementation, existing programs could lower the anticipated deficit by approximately 9 MW across the entire 2000-square-mile service area, of which the area west of Franklin represents 5 percent.

It is unlikely that development and implementation of any additional conservation efforts would be possible in a time frame that would meet the identified system need. This assumption is based on the findings of a 2002 study of demand-side management options for the Tennessee Valley and the current 2004 load demand. This study explored energy efficiency program options that could supply electricity savings within 2 years. This study indicated a potential load reduction of 3.4 average MW and 6.7 peak MW across the entire MTEMC service area (Appendix III).

It was projected that the implementation of a combination of existing and proposed efficiency programs in 2003 could have resulted in a peak load reduction of 15.7 MW in the MTEMC service area through 2004. Prorating these conservation efforts to the area west of Franklin using square miles of area served as the basis, the resulting load reduction would have been less than 1 MW. This reduction would have left a West Franklin area system deficit of 61 MW. Based on this 61-MW deficit, conservation would not have met the objectives or needs of the West Franklin/western Williamson County area.

2.4. Description of Construction, Operation, and Maintenance of the Proposed 161-kV Transmission Line

2.4.1. Transmission Line Construction

2.4.1.1. Structures and Conductors

The proposed transmission line would primarily use single-steel poles (Figure 2-1). Their height would vary according to the terrain and would average between 80 to 90 feet.

Figure 2-1. Single-Pole 161-kV Transmission Structures

Three conductors (the cables that carry the electrical current) are required to make up a circuit in alternating current transmission lines. For 161-kV transmission lines, each conductor is made up of a single cable. The conductors are attached to fiberglass or ceramic insulators suspended from the structure cross arms. A smaller overhead ground wire is attached to the top of the structures. This ground wire may contain fiber optic communication cables. Two lower voltage lines belonging to MTEMC would be placed on the same structures beneath the lowest 161-kV conductor.

Poles at angles in the line may require supporting guy wires. Some structures for larger angles could require two or three poles. The poles and related steel hardware would be painted a color that appears as predominately black and is similar to the standard color (Franklin Green) used by the city of Franklin. Most poles would be directly imbedded in holes augured into the ground to a depth equal to 10 percent of the pole's length plus an additional 2 feet. The holes would normally be backfilled with the excavated material. In some cases, gravel or a cement and gravel mixture might be used. Some structures may be self-supporting (non-guyed) poles fastened to a concrete foundation that is formed and poured into an excavated hole.

Equipment used during the construction phase would include trucks, truck-mounted augers and drills, as well as tracked cranes and bulldozers.

2.4.1.2. Right-of-Way Acquisition and Clearing

New right-of-way would be needed for the transmission line. This right-of-way would normally be 100 feet wide with two exceptions. First, the section of the transmission line

route alternatives that parallel the existing Mack Hatcher Parkway would have widths of 30 to 60 feet. Second, the section of the transmission line route alternatives that parallel the existing Del Rio Pike may have overlapping road and utility easements, which would reduce the amount of new right-of-way needed.

TVA would purchase easements from landowners for the new right-of-way on private land. These easements and land give TVA the right to construct, operate, and maintain the transmission line as well as remove danger trees off the right-of-way. Fee title for the land within the right-of-way would normally remain with the landowner, and a number of activities could be continued on the property by the landowner. The easement would prohibit certain activities such as the construction of buildings and any other activities within the right-of-way that could interfere with the transmission line or create a hazardous situation.

Because of the need to maintain adequate clearance between tall vegetation and transmission line conductors, as well as to provide access for construction equipment, most trees and shrubs would be initially removed from the entire width of the right-of-way. Equipment used during this right-of-way clearing includes chain saws, skidders, bulldozers, and/or feller-bunchers. Marketable timber would be salvaged where feasible; otherwise, woody debris and other vegetation would be piled and burned, chipped, or taken off site. In some instances, vegetation may be windrowed along the edge of the right-of-way to serve as sediment barriers. Vegetation removal in streamside management zones (SMZs) and wetlands would be restricted to trees tall enough, or with the potential soon to grow tall enough, to interfere with conductors. Clearing in SMZs would be accomplished using hand-held equipment or remote handling equipment, such as a feller-buncher, in order to limit ground disturbance. Right-of-Way Clearing Specifications, Environmental Quality Protection Specifications for Transmission Line Construction and TVA Transmission Construction Guidelines Near Streams are included in Appendixes IV, V, and VI.

Any trees located off the right-of-way that are tall enough to pass within 5 feet of a 161-kV conductor or structure (if it were to fall toward the line) are designated “danger trees” and would be removed.

Subsequent to clearing and construction, the right-of-way would be restored as much as is possible to its state prior to construction. Pasture areas would be reseeded with suitable grasses. Wooded areas would be revegetated using native grasses and other low-growing species. Erosion controls would remain in place until the plant communities were fully established. Streamside areas would be revegetated as described in Section 4.8, Summary of TVA Commitments and Proposed Mitigation Measures, of this document.

2.4.1.3. Access Roads

Permanent access roads would be needed to allow vehicle access to each structure and other points along the right-of-way. TVA would obtain the necessary rights for these access roads from landowners. Existing roads including farm and field roads, some of which may need upgrading, would be used where possible. New access roads would be located on the right-of-way wherever possible and designed to avoid severe slope conditions and minimize stream crossings. New access roads would be about 20 feet wide and surfaced with dirt or gravel. Culverts and other drainage devices, fences, and gates would be installed as necessary. New access roads would be planted with approved seed mixtures following construction. Additional applicable environmental quality protection specifications are listed in Appendixes IV and V.

The actual locations of access roads cannot be determined until a preferred corridor and specific alignments have been chosen and individual structure locations are known. The locations of access roads would be closely coordinated with potentially affected landowners.

2.4.1.4. Construction Assembly Areas

One or more construction assembly areas would be required for worker assembly, vehicle parking, and material storage. These areas may be on existing substation property or leased from a private landowner for the duration of the construction period. These areas are typically 5 to 10 acres in size, relatively flat, previously cleared, and located adjacent to an existing paved road near the transmission line. Depending on site conditions, some minor grading and installation of drainage structures may be required. The areas would be graveled and fenced, and trailers used for material storage and office space would be parked on the areas. Following the completion of construction activities, all trailers, unused materials, and construction debris would be removed from the site. Removal of the fence and restoration would be at the discretion of the landowner.

2.4.1.5. Conductor and Ground Wire Installation

Reels of conductor and ground wire would be delivered to various staging areas along the right-of-way, and temporary clearance poles would be installed at road and railroad crossings to reduce interference with traffic. A small rope would be pulled from structure to structure. It would be connected to the conductor and ground wire and used to pull them down the line through pulleys suspended from the insulators. A bulldozer and specialized tensioning equipment would be used to pull conductors and ground wires to the proper tension. Crews would then clamp the wires to the insulators and remove the pulleys.

2.4.2. Operation and Maintenance

2.4.2.1. Inspection

Periodic inspections of 161-kV transmission lines are performed from the ground and by aerial surveillance using a helicopter. These inspections are conducted to locate damaged conductors, insulators, or structures, and to report any abnormal conditions that might hamper the normal operation of the line or adversely impact the surrounding area. During these inspections, the condition of vegetation within the right-of-way, as well as immediately adjoining the right-of-way, is noted. These observations are then used to plan corrective maintenance or routine vegetation management.

2.4.2.2. Vegetation Management

Management of vegetation along the right-of-way would be necessary to ensure access to structures and to maintain an adequate distance between transmission line conductors and vegetation. For a 161-kV transmission line, National Electric Safety Code standards require a minimum clearance of 24 feet.

Management of vegetation along the right-of-way would consist of two different activities: felling of “danger trees” adjacent to the cleared right-of-way and control of vegetation within the cleared right-of-way.

Management of vegetation within the cleared right-of-way would use an integrated vegetation management approach designed to encourage the low-growing plant species and discourage tall-growing plant species. A vegetation-reclearing plan would be developed for each transmission line segment based on the results of the periodic inspections described above. Given the land use in the area of this project, right-of-way maintenance is expected to be minimal. The two principal management techniques are mechanical mowing, using tractor-mounted rotary mowers, and herbicide application. Herbicides are normally applied in areas where heavy growth of woody vegetation is occurring on the right-of-way and mechanical mowing is not practical. Herbicides would be selectively applied from the ground with backpack sprayers or vehicle mounted sprayers.

Any herbicides used would be applied in accordance with applicable state and Federal laws and regulations and the commitments listed in this document. Only herbicides registered with the United States Environmental Protection Agency (USEPA) would be used. Appendix VII contains a list of the herbicides and adjuvants (ingredients added to the herbicide solution to increase its effectiveness) currently used by TVA in right-of-way management. This list may change over time as new herbicides are developed or new information on presently approved herbicides becomes available.

Other than vegetation management, little other maintenance work would normally be required. The transmission line structures and other components typically last several decades. In the event that a structure must be replaced, the structure would normally be lifted out of the ground by crane-like equipment and the replacement structure inserted into the same hole or an immediately adjacent hole. Access to the structures would be on existing roads where possible.

2.5. Project and Siting Alternatives

The process of siting a transmission line followed the basic steps used by TVA to determine a transmission line route.

- Determine potential existing power sources to supply the substation.
- Define the study area.
- Collect data to minimize potential impacts to cultural and natural features.
- Develop general route options and potential routes.
- Delimit one or more alternative transmission line routes within the option(s).
- Gather public input.
- Incorporate public input into the final selection of the transmission line route.

The following describes TVA's transmission line siting evaluation and process chronologically to show how the identification of reasonable transmission line routes and the selection of a preferred route was informed by and adjusted to respond to comments TVA received from landowners, other stakeholders, and officials. TVA's transmission line siting process is comprehensive and takes into account a large number of criteria, including potential environmental impacts, in order to winnow down the typically large number of possible transmission line routes. The siting process for this proposed action was particularly complex and involved because of the extraordinary efforts TVA and MTEMC (with respect to its selection of a substation site) made to accommodate public and landowner concerns and comments leading to sequential adjustment of transmission line route segments.

Because of the particular complexity of this siting process, a general overview of the transmission line siting process might be helpful. When TVA proposes to serve some location (a new substation as is the case here), it begins by identifying a study area and within that study area, transmission line route options or corridors. These corridors can be broad (miles wide). After assessing the feasibility of the identified corridors, the siting process typically rates one or two corridors as preferable options for routing the proposed transmission line and further analysis of these corridors continues. TVA then identifies one or more feasible transmission line routes within the remaining corridors.

2.5.1. Definition of Study Area

The first task in defining the study area was to identify the power sources that could supply the identified need. At the beginning of the siting process, the goal, at that time, was to supply power to MTEMC's planned Bingham Substation site. As the siting process developed, MTEMC informed TVA that it was highly likely in the long term that another new substation would be needed somewhere in the West Franklin area.

The study area was defined based on the location of potential practical routes between potential power sources and the new substation. For this study, the regional study area included portions of northern Williamson and southern Davidson Counties. Its boundary was the Fairview area to the west, the Davidson 500-kV Substation to the north, Franklin to the east, and the Maury-Radnor 500-kV Transmission Line to the south.

The towns of Franklin and Fairview are within the study area. Smaller population centers include Leipers Fork and Fernvale. The refined study area encompasses approximately 270 square miles or 172,800 acres (Figure 1-1).

Steep, forested hills and coves dominate the western portion of the study area. Backbone Ridge and Harpeth River are the dominant features. Other features include Tom Redford Ridge, Boxley Valley, Waddell Hollow, and Ropers Knob.

The Natchez Trace Parkway runs north to south in the study area. The Basin Springs Natural Area contributes to the protection of scenic views and serves as habitat for threatened and endangered species. The study area also includes numerous historic and archaeological sites, cemeteries, and churches. New State Highway 96, designated as a Heritage Road, serves as a major gateway to Franklin.

The western and northern portions of the study area are mainly forested, rugged terrain and valleys with scattered houses and small roadside businesses. The major population center in the western portion is Fairview. The southern portion of the study area includes the community of Leipers Fork. The area is a pastoral environment that includes numerous heritage roads. The eastern portion of the study area includes the suburban and exurban development associated with Nashville and Davidson County. The largest population center is the historic city of Franklin.

Major transportation routes in the study area include: U.S. Highway 431 (from Nashville south through Williamson County), State Highway 100 (from Fairview northeast to Nashville), State Highway 96 (from State Highway 100 east to Franklin), and State Highway 46/Old Hillsboro Road (from U.S. Highway 431 south through the study area).

The study area contains the following Exceptional Heritage Roads as designated by the Williamson County Heritage Foundation (shown in Figures 1-1, 1-2, and 1-3):

- Boyd Mill Pike
- Natchez Trace Parkway
- Old Natchez Trace

2.5.2. Collect Data

Geographic data, such as topography, land use, transportation, environmental features, cultural resources, near-term future development, and land conservation information were collected for the entire study area. Analysis of the data was aided by using a geographic information system (GIS). This system allowed the multitude of factors of the large study area to be examined simultaneously to develop and evaluate numerous options and scenarios to determine the route or routes that would best meet project objectives.

Maps were created to show clearly any regional opportunities and constraints. Sources included 1 inch = 500 feet aerial photography, county tax maps/property boundaries, United States Geological Survey digital line graphs, Digital Elevation Models, National Wetlands Inventory, and cultural resource data, among others. Aerial photography was interpreted to obtain land use and land cover data, such as forests, agriculture, wetlands, houses, barns, commercial and industrial buildings, churches, and cemeteries. Data were analyzed both manually and with GIS. Manual calculations from aerial photographs, tax maps, and other sources included the number of road crossings, stream crossings, and property parcels.

The siting team used GIS to analyze multiple factors when defining and comparing alternative routes. GIS displays and analyzes multiple layers of information simultaneously using geographically referenced digital information.

For this project, GIS data analysis included steep slope crossings, land cover, land use, and other data. A 1:100,000 GIS database was developed and used for regional opportunity and constraint analysis, while a 1:24,000 database was developed for more complex computations, such as acreage of wetlands and percent slope.

2.5.3. Develop General Route Options and Potential Transmission Line Routes

From the information gathered during the MTEMC system studies and data development phases, four transmission line route corridors or options were identified to connect the identified power sources to the planned MTEMC Bingham Substation (Figure 1-1). The first corridor option involved linking the Bingham Substation site with the Davidson 500-kV Substation to the north (Option A). The second corridor option involved linking the Bingham Substation site to the Aspen Grove Substation or the Franklin Substation in the city of Franklin (Option B). The third corridor option involved linking the Bingham Substation site to the Maury-Radnor Transmission Line, located in the southern portion of the study area (Option C). The fourth corridor option involved linking the Bingham Substation site to the Jingo Substation or to the Davidson-Centerville Transmission Line, located in western Williamson County near Fairview (Option D).

Within each option (A, B, C, and D), a network of potential transmission line routes were developed. The potential transmission line routes illustrate numerous alternatives for constructing a transmission line from the power source to the planned Bingham Substation,

avoiding wherever possible all critical features. Each potential transmission line route was comprised of individual segments that were analyzed and compared against each other. The best segments were identified to help eliminate some of the transmission line alternatives. Of the more than 100 transmission line route possibilities identified early in the process, Option A had the fewest with 2, followed by 17 in Option D, 34 in Option C, and more than 50 in Option B. Transmission line route possibilities were added or eliminated throughout the process as new information on critical resources was obtained to develop a reasonable range of transmission line right-of-way alternatives.

2.5.3.1. Details of Option A

Option A involved developing an alternative transmission line route network from the Davidson 500-kV Substation in the southwest corner of Davidson County, following the Maury-Davidson 500-kV Transmission Line south approximately 9.1 miles to the planned Bingham 161-kV Substation. Only one potential corridor was identified, since it would be preferable to parallel the existing line to minimize the need for new right-of-way. The width of the study area was approximately 2000 feet on either side of the Maury-Davidson 500-kV Transmission Line. Approximately 3 miles of the study area is in Davidson County, and the remainder is in Williamson County. The centerline of the 161-kV line would need to be a minimum of 100 feet from the 500-kV line, and the right-of-way would extend a minimum of 50 feet beyond the 161-kV line.

Starting near the Davidson Substation, the new transmission line would go south along the west side of the existing lines. The route would cross under the Maury-Davidson Transmission Line about 0.5 mile north of State Highway 99 and follow the east side of the transmission line to the Bingham Substation. Population growth is occurring around the Davidson Substation. The remainder of this route does not include any large population centers and is primarily undeveloped. The area is mainly forested terrain with scattered residential housing. Mountainous areas include Egypt Hollow, Waddell Hollow, and Backbone Ridge. Natural features include Poplar Creek, Brown Creek, and Little East Fork. There are numerous historic and archaeological resources near this route. This option would not serve a substation location in the West Franklin area.

After the initial evaluation, TVA decided to investigate the potential of a 161-kV transmission line underbuild on the existing 500-kV transmission line. An underbuild would consist of replacing the existing transmission line structures with new structures that would support both the present 500-kV circuit and an additional 161-kV circuit underneath the 500-kV transmission lines. TVA determined that this was a technically feasible option, although the necessity of outages on the existing transmission line associated with construction would lengthen the construction process by at least 2 or 3 years and cost an additional $800,000 for mobilizing, demobilizing, and remobilizing construction forces over the long construction period. Option A routes would be over 9 miles long.

2.5.3.2. Details of Option B

Option B required developing an alternative network of routes between the Aspen Grove 161-kV Substation or the Franklin 161-kV Substation and the Bingham 161-kV Substation site. The Aspen Grove Substation is located on Mack Hatcher Parkway, and the Franklin Substation is located on Eddy Lane. MTEMC indicated that a connection to Aspen Grove would be needed if a route were chosen that started at the Franklin Substation.

The potential routes would follow a portion of the Mack Hatcher Parkway, Del Rio Pike, and Boyd Mill Pike, and then cross the West Harpeth River and Old Hillsboro Road before reaching the Bingham Substation site. The path from the Franklin Substation is north along Eddy Lane and the CSX Railroad, turning west crossing U.S. Highway 31 and joining the route along Mack Hatcher Parkway east of U.S. Highway 431. The Option B route's length between the Aspen Grove Substation and Bingham Substation site is approximately 8 miles.

Growth from Nashville extends southward including suburban and exurban development in the neighborhood of Franklin. It includes single and multifamily residential, industrial, and commercial land uses. Subdivisions such as Founders Pointe and Rebel Meadows are nearby. The western portion of the area related to this option, near the Bingham Substation site, is more agricultural and less densely populated. Natural features include the Harpeth River, the West Harpeth River, Spencer Creek, and Ropers Knob. There are numerous historic and archaeological resources near this option. This option could serve a substation location in the West Franklin area.

2.5.3.3. Details of Option C

Option C required developing an alternative network of transmission line routes between tap points along the Maury-Radnor 161-kV Transmission Line and the Bingham Substation site. Tap points were identified where the Maury-Radnor Transmission Line crosses U.S. Highway 31, Kitrell Road, and West Harpeth Road. From these tap points, several alternative paths were projected northwest toward the Bingham area west of Franklin. The transmission line routes within this study area would be approximately 7.5 miles long and cross Carters Creek Pike between Southall and Leipers Fork Church before reaching the Bingham Substation site. Some transmission line routes would follow the Maury-Davidson 500-kV Transmission Line north to the Bingham area west of Franklin. Cultural features in this area include Southall Road and Boyd Mill Road. This option could serve a substation location in the West Franklin area.

The area associated with Option C was predominantly pasture and farmland. Natural features include West Harpeth River, Murfrees Fork, Polk Creek, and Boxley Valley.

2.5.3.4. Details of Option D

Option D required developing an alternative network of transmission line routes between the Jingo Substation or from tap points along the Davidson-Centerville 161-kV Transmission Line and the Bingham Substation site. These alternatives are located near the Fairview Community in Williamson County to the south and Davidson County in the northernmost portion of the study area. Transmission line route alternatives in this study area vary in length from approximately 12 miles for the Jingo Substation alternative to approximately 10 miles from tap line alternatives west of State Highway 100. All transmission line paths within this study area are southeast of the Fairview area and cross the Natchez Trace Parkway between the Leipers Fork exit and the State Highway 96 exit before ending at the Bingham Substation site.

The small community of Fernvale is located in the study area, and Fairview is the larger population center. Development is scattered throughout the study area and is primarily residential; a children's summer camp is also located in the area. Natural features include Backbone Ridge, Tom Redford Ridge, East Fork Creek, Bedford Creek, and Hunting Camp

Creek. There are numerous historic and archaeological resources near this option. This option could serve a substation location in the West Franklin area.

2.5.4. Route Network Development

The main step in developing a transmission line route was to identify a network of feasible routes using the network of all possible transmission line routes above. Thirty-five transmission line route alternatives were identified. Option A had two potential transmission line routes, Option B had 20 potential routes, Option C had six potential routes, and Option D had seven potential routes. (Numerous additional potential transmission line routes were identified, but many differed in only very minor aspects, and analysts discarded them to allow for a reasonable evaluation process.) Many of the Option B transmission line routes were adjusted as new information on critical resources was obtained.

2.5.5. Establish and Apply Siting Criteria

TVA has long employed a set of evaluation criteria that represent opportunities and constraints for development of transmission line routes. The criteria are oriented toward factors such as existing land use, ownership patterns, environmental features, cultural resources, and visual quality. Cost is also an important factor, with engineering considerations and right-of-way acquisition cost being the most important elements. In addition, the scenic and historic resources in this study area required special consideration. Information gathered and comments made at public meetings were taken into account, while refining criteria to be specific to the study area and special criteria were added related to the Natchez Trace Parkway, other historic roads, and Tennessee Century Farms.

Each of the transmission line alternative routes was evaluated according to these criteria relating to engineering, environmental, land use, and cultural concerns. Specific criteria are described below; for each category described, a higher score means a bigger constraint. For example, a greater number of streams crossed, a longer transmission line route length, or a greater number of historic resources affected would give an alternative transmission line route a worse score.

- *Engineering Criteria*: total length of the transmission line route, length of new right-of-way and rebuilt right-of-way, primary and secondary road crossings, pipeline and transmission line crossings, and total transmission line cost
- *Environmental Criteria*: slopes greater than 30 percent (steeper slopes mean more potential for erosion and potential water quality impacts), slopes between 20 and 30 percent, visual aesthetics, forested acres, open water crossings, sensitive stream (those supporting endangered or threatened species) crossings, perennial and intermittent stream crossings, wetlands, rare species habitat, natural area crossings, and wildlife management areas
- *Land Use Criteria*: the number of fragmented property parcels, schools, houses, commercial or industrial buildings, barns, and parkland crossings
- *Cultural Criteria*: archaeological and historic sites, churches and cemeteries, caves, Tennessee Century Farms, the Natchez Trace Parkway, and heritage roads

Scores for each of the alternatives were calculated by adding individual criterion values for each transmission line route. The resulting sum values were evaluated using standard

statistical techniques and were assigned a ranking from 1 to 4 for each route in each subcategory (engineering, environmental, land use, and cultural).

A weighted score was produced for each transmission line route in each subcategory. This made it possible to understand which routes would have the lowest and highest impacts on engineering, environmental, land use, and cultural resources. Finally, to determine total impacts, the scores from each category were combined for an overall score.

Option A - Siting Constraints

Option A transmission line routes had more impacts on natural areas than other options. These transmission line routes had a greater amount of steep slopes between 20 to 30 percent than other routes. Transmission line routes in Option A were the only routes within 100 feet of a cemetery. Like the other options, Option A transmission line routes had numerous historic sites located nearby that are listed on the National Register of Historic Places (NRHP). Option A had fewer, but more significant constraints than any other option. The largest constraint associated with Option A was the crossing of the Natchez Trace Parkway. The largest constraint associated with the transmission line underbuild option was the required time for construction. For systems' planning, Option A would have over 34 miles of transmission line without circuit breakers. This connected exposure increases the risk of service interruptions in the area.

Advantages included:

- Strong source of power.
- Parallels or underbuilds on an existing 500-kV transmission line.

Option B - Siting Constraints

Siting constraints in this area included existing subdivisions and other residential, commercial, and institutional development including a school and church near Del Rio Pike. Other constraints included more primary road crossings and heritage road crossings. Option B affected more commercial development, historic sites (Tennessee Century Farms), and archaeological sites than any other option.

Advantages included:

- Strong source of power.
- Least amount of connected exposure (4-8 miles).
- Use of 1 mile of existing line.
- Conducive to long-range plans (would serve future West Franklin Station as well as provide additional reliability to the Aspen Grove Substation/Cool Springs area).

Option C - Siting Constraints

Siting constraints in this area included visibility issues associated with several heritage roads including Boyd Mill Pike and Southall Road. The pastoral character of the valley as well as the poorer quality of the Maury-Radnor Transmission Line as a power source made Option C less desirable. Other siting issues included steep slopes, minor stream crossings,

numerous historic structures nearby, and fragmentation of forested acres. This option has over 37 miles of connected exposure.

Option D - Siting Constraints

Siting constraints in this area include visibility, effect on the rural community, and crossing of the Natchez Trace Parkway. Option D has the longest and most expensive transmission line routes with the steepest slopes of any option. It also has a higher number of minor stream crossings and is the only option that affects a natural area—Basin Springs. Option D did provide an adequate source of power, but the transmission line to be tapped is a low-capacity conductor. With over 36 miles of connected exposure and the weakest source of power, Option D did not meet the power and reliability needs as well as the other options.

2.5.6. Identify Preferred Option

Options C and D were eliminated as reasonable route options and were not subjected to more detailed analyses after the preliminary transmission line route screening analyses. Option C was more expensive, had over 37 miles of connected exposure, and did not fit into the long-range plans of the area. Because Option D triggered substantial negative public reaction and because this option offered the weakest electrical solution to MTEMC's power supply needs, it was dropped from further consideration and evaluation fairly early in the process. Both options also had a number of adverse environmental impacts.

For Option A, one transmission line route ranked first among all of the routes. In Option B, many of the transmission line routes ranked highly compared with other route options. Although many of the B transmission line routes had negligible differences in overall impact, two had the least overall impact of all transmission line routes.

The final analysis showed that a variation of Option A ranked first, while many of the Option B transmission line routes were ranked as top routes. The Option A transmission line route, however, had a significant constraint because of the approvals that would be needed from the National Park Service for an additional crossing of the Natchez Trace Parkway and the use of National Park Service land for right-of-way. Obtaining approval by the National Park Service was considered very unlikely. The second Option A transmission line route, which involved rebuilding the existing 500-kV transmission line with the 161-kV transmission line strung underneath on the same towers would require an outage of the 500-kV transmission line. Such an outage on the TVA bulk power system is only possible in certain low-load seasons of the year. These outages vary in the length of time that the line can be out of service, but the removal of the existing line and the construction of the new line would require multiple outages, probably over several calendar years. This lengthy process would unacceptably delay the in-service date. In addition, this Option A route would not help in serving the future loads in the West Franklin area. These constraints lessened the ability of Option A route alternatives to meet project needs.

Because of these constraints, as well as the results of the preliminary analysis, which identified many of the top potential transmission line routes as Option B routes, TVA decided to investigate a transmission line route within Option B further. The decision was also made to focus on transmission line route alternatives that began at the Aspen Grove Substation since a connection at Franklin would still require a connection to Aspen Grove and because of the development that significantly restricted any new transmission line route leaving the Franklin Substation.

The subsequent investigation of Option B transmission line route alternatives entailed detailed field reconnaissance and discussions with numerous individual property owners, as well as local elected officials, and public interest groups.

2.6. Identification of the Preferred Route Segment

The transmission line route identified as having the best score among the Option B routes was chosen as the basis for development of TVA's preferred route and is identified as the Main Corridor Alternative (Figure 1-2). This route and possible alternatives were identified based on additional meetings with the public, local and state government officials, potentially affected landowners, and on-ground reconnaissance by TVA engineering and biological staffs. The original Main Corridor Alternative route projection and the alternate routes are described in the four following sections.

Right-of-way width for the transmission line route would be 100 feet wide except as follows: The first section of the Main Corridor Alternative route, would have the transmission line right-of-way centerline parallel to and 10 feet north of the Mack Hatcher Parkway right-of-way for approximately 4200 feet, resulting in the purchase of a new right-of-way width of 60 feet. The next section of approximately 2700 feet would have the centerline immediately south of the service road along Mack Hatcher Parkway, resulting in the need to purchase a new right-of-way width of 30 feet, north of the service road. The last portion of this section would be about 4200 feet long and would have the centerline immediately adjacent to the north edge of Mack Hatcher Parkway, resulting in the need to purchase a new right-of-way width of 50 feet north of the parkway. In addition, the section of the Mack Hatcher transmission line route alternatives that parallel the existing Del Rio Pike may have overlapping road and utility easements, which would reduce the amount of new right-of-way width needed to less than 100 feet.

2.6.1. Aspen Grove to U.S. Highway 431

Two alternate routes were identified with similar scores between the Aspen Grove Substation and U.S. Highway 431. One was approximately parallel to Mack Hatcher Parkway on the north, and the second was approximately parallel to Mack Hatcher Parkway on the south. The northern alternative offered the advantage of allowing the transmission line right-of-way to overlap with the road right-of-way, thus reducing the total acreage of new land to be encumbered when compared to the southern route. From an engineering standpoint, the use of the southern route was problematic. The curve of the road would require that the transmission line structures have guy wires extending toward, rather than away from, the roadbed. This would require a wider right-of-way between the structures and the road right-of-way. The southern route would also have been somewhat closer to Ropers Knob, a historic resource. Field observations did not indicate any appreciable differences in the potential for environmental effects between the two routes. Land use aspects of the two routes were also very similar.

Based on these considerations, the alternative along the north side of Mack Hatcher Parkway was selected as the preferred alternative for this portion of the route.

2.6.2. U.S. Highway 431 to Bingham

The route segment combination, which was originally identified as having the best score among the Option B routes, is labeled as the Main Corridor Alternative and shown as a

green dashed line on Figures 1-2 and 1-3. This route would move almost due west from the U.S. Highway 431 interchange across Baugh Bend of the Harpeth River, turn due south about 1000 feet west of the second river crossing at Baugh Bend, avoid an identified historic structure, and would then turn due west again. The route would then continue west for about 6000 feet, turn back to the north along a property line, and then back west. This route section would roughly parallel the southern route alternative shown by the Tennessee Department of Transportation (TDOT) for the proposed extension of Mack Hatcher Parkway. This turn north would also allow the route to avoid two additional historic properties, but would force a crossing of a bend of the West Harpeth River. The route then would move south and west on to the Bingham Substation site, cross the West Harpeth three more times, and pass between two more identified historic structures.

Based on additional analysis of available data and comments from landowners and other interested parties, alternative route segments were identified in the vicinity of the Main Corridor Alternative as possible modifications to that route.

Alternative Route Segment A is shown as a dashed light purple line on Figure 1-3. This alternative would cross U.S. Highway 431 immediately north of the Rebel Meadows Subdivision and then turn south, avoiding a crossing of the Harpeth River. The route would then go around the end of Baugh Bend and turn back to run generally west before intersecting the original Main Corridor Alternative route projection.

Alternative Route Segment B is shown as a black line on Figures 1-2 and 1-3. This alternative would follow the original Main Corridor Alternative until a point about 1000 feet west of the third crossing of the Harpeth River. At this point Alternative B would continue west approximately following a northern route alternative shown by TDOT for the proposed extension of Mack Hatcher Parkway for about a mile, and then continue on to intersect the original Main Corridor Alternative at a point immediately east of the West Harpeth River.

Alternative Route Segment C is shown as a dashed red line on Figures 1-2 and 1-3. This alternative follows the original Main Corridor Alternative until a point about 4000 feet west of the Harpeth River, where it would leave this projection and continue almost due west for about 2000 feet, and then turn south to a point immediately north of State Highway 96. It would then cross State Highway 96 and Boyd Mill Pike and run west parallel to Boyd Mill Pike on the south side for about 3000 feet, cross State Highway 96 and run parallel for about 4000 feet, angle around a bend of the West Harpeth, and then rejoin the original projected Main Corridor Alternative.

2.6.3. U.S. Highway 431 to the West Franklin Area

Alternative Route Segment D is shown as a dashed dark purple line on Figure 1-3. This alternative was identified after publication of the Draft EA because of comments and requests from the public for MTEMC to consider construction of the substation in the "West Franklin" area instead of at the Bingham site. This alternative follows the original Main Corridor Alternative until a point about 1000 feet west of the third crossing of the Harpeth River. Two alternate substation sites in the West Franklin area along Alternative Route Segment D were identified by MTEMC (Figure 1-3).

2.6.4. U.S. Highway 431 to the Westhaven Subdivision Area

Subsequent to the decision by MTEMC to consider development of a substation site nearer to the western edge of Franklin, comments from the public and local officials continued to

urge consideration of co-location of the transmission line with the proposed extension of Mack Hatcher Parkway. Several possible sites were investigated, and early in 2004, MTEMC identified another potential substation site located south of Highway 96 within the planned Westhaven development as shown in Figure 1-3.

Two new route alternatives were identified to reach this site. These route alternatives are shown on Figure 1-3. From the Aspen Grove Substation to the west bank of the Harpeth River (third crossing) these two alternatives were identical to the Alternative Route Segment B discussed previously. At this point one alternative route, designated as the North Mack Hatcher Alternative, would turn north to run approximately parallel to Alternate Route 16, TDOT's northern route for the Mack Hatcher Parkway extension, which was identified in TDOT's Draft EIS (U.S. Department of Transportation Federal Highway Administration and Tennessee Department of Transportation, 2004). This transmission line route would then turn south, approximately following Alternate Route 15, TDOT's southern route for the Mack Hatcher Parkway extension, on the east, until it would cross Highway 96 and proceed to the proposed West Franklin area substation site near the Westhaven Subdivision.

The South Mack Hatcher Alternative would extend west about 700 feet after the last crossing of the Harpeth River. It would then turn due south until it neared Del Rio Pike, where it would turn west parallel and just north of Del Rio Pike and adjacent to TDOT's Alternate Route 18 for the Mack Hatcher Parkway extension. After running west for about 4000 feet, this alternative transmission line route would turn south approximately following Mack Hatcher Parkway extension Alternate Route 15, on the east, across Highway 96 and proceed to the proposed West Franklin area substation site near the Westhaven Subdivision.

2.6.5. Preferred Route Selection

Each of the alternative routes shown in Figures 1-2 and 1-3 were analyzed using the numerical criteria discussed above. Field studies were carried out, and extensive contacts were made with potentially affected landowners and with other interested parties.

The Main Corridor Alternative route offered minimal impact to historic resources and, in fact, passed within 1000 feet of only two structures. This route also avoided most of the developed residential areas present within the portion of the study area west of U.S. Highway 431.

Alternative Route Segment A avoided two river crossings. However, it would be located in very close proximity to two identified historic structures. Also, it was determined that if TDOT's proposed Mack Hatcher Parkway extension followed its announced southern route, there would be difficulty in placing the new transmission line in the area remaining between the Mack Hatcher Parkway extension and the river. In that event, use of this alternative would result in the removal of most of the riparian trees on the east bank of the Harpeth River on Baugh Bend with associated environmental impacts.

Alternative Route Segment B was located north of the Main Corridor Alternative route and offered the advantage of being further from a listed historic structure. This alternative route segment also offered the advantage of being outside the viewshed of this structure and Del Rio Pike.

Alternative Route Segment C offered the advantage of eliminating four crossings of the West Harpeth River. This route would have resulted in a location parallel and adjacent to Boyd Mill Pike for a distance of approximately 6000 feet. Boyd Mill Pike has been designated as a Heritage Road by the Heritage Foundation of Franklin and Williamson County and has been deemed eligible by the Tennessee Historic Preservation Officer for listing in the NRHP.

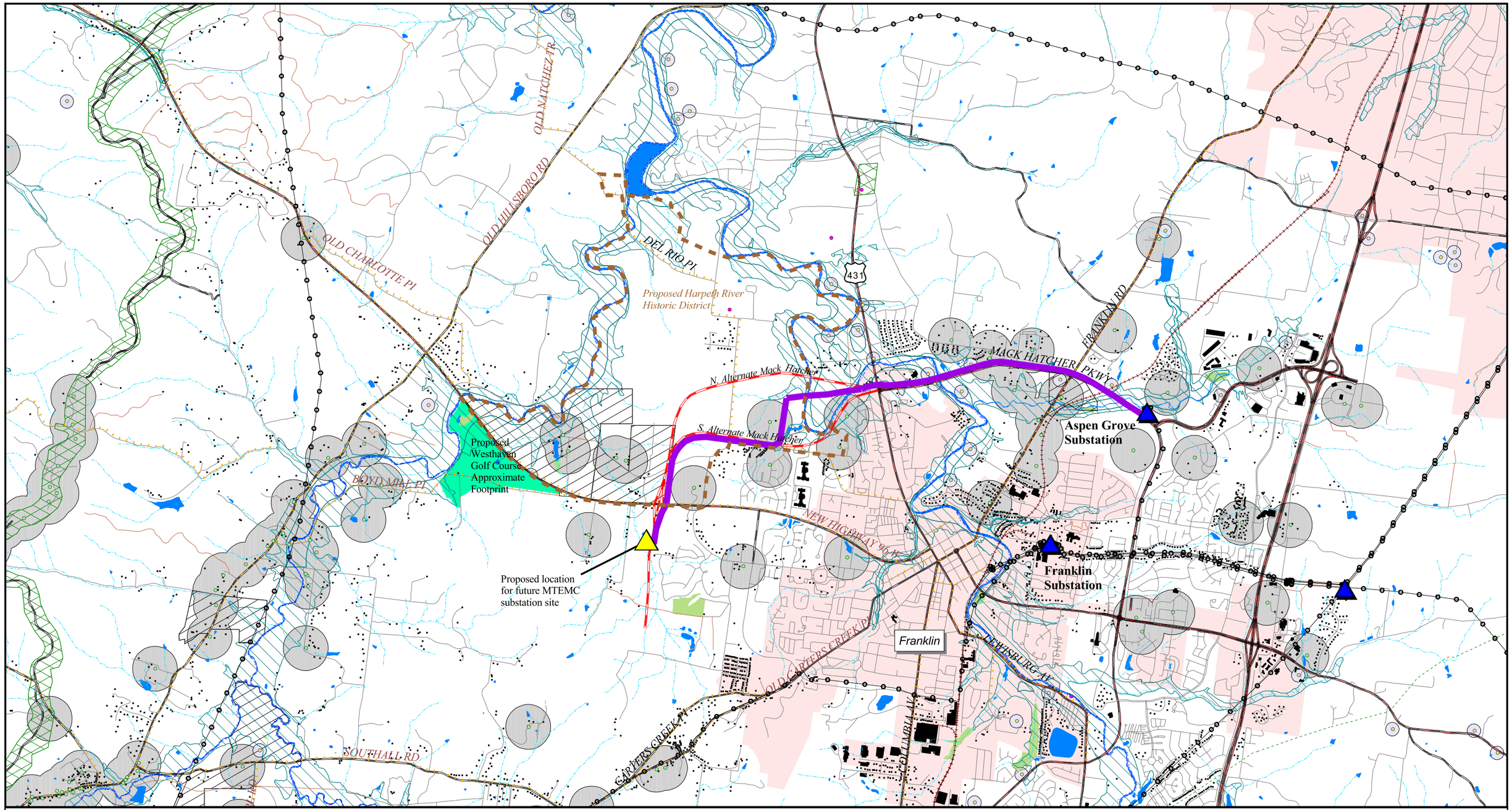
Developed based on public input to the original proposed route identified as preferred, Alternative Route Segment D offered the advantage of eliminating the five crossings of the West Harpeth River and shortening the proposed transmission line route by nearly half. This route would utilize the future planned MTEMC substation in the West Franklin area as the immediate planned substation instead of the Bingham Substation.

The North Mack Hatcher and the South Mack Hatcher Alternative routes were also developed in response to public input and to serve a substation site in the West Franklin area near the Westhaven Subdivision, specifically the site south of Highway 96 (Figure 1-3). They offered the same advantage in reduction of river crossings as did Alternative Route Segment D. Field studies revealed little difference in environmental effect between the North Mack Hatcher and the South Mack Hatcher Alternative routes. Both routes would be located for some distance within the Harpeth River Historic district. However, the south alternative would be located at the edge of the district for much of its length where it would run parallel to Del Rio Pike.

The South Mack Hatcher Alternative would be located along property boundaries for almost all of its length whereas the North Mack Hatcher Alternative would bisect a large property tract. The south alternative would be located nearer to one site eligible for listing in the NRHP, the James B. Davis house, than would the north route. The Tennessee Historical Commission has stated that both routes would have an adverse effect on the proposed district, but that TVA's proposed mitigation would resolve these adverse effects.

The South Mack Hatcher Alternative would be located in an area where existing infrastructure, roads and utilities, already exist and therefore would have somewhat less effect on existing and future land use.

After a full evaluation, which included the decision by MTEMC to build the new substation (Westhaven Substation) at the western edge of the city of Franklin in the vicinity of the Westhaven Subdivision, a preferred route was selected which utilized the Main Corridor Alternative projection modified by use of the South Mack Hatcher Alternative (Figure 2-2). To the maximum extent possible, this route minimizes impacts to historic resources to levels that can be successfully mitigated, could be built without materially impacting aquatic resources, and appears to best balance the various landowner interests in the area as determined by TVA's contacts with landowners.



WILLIAMSON COUNTY, TENNESSEE POWER SUPPLY
Aspen Grove 161-kV Transmission Line
Figure 2-2. Aspen Grove - Westhaven 161-kV Transmission Line - Preferred Route

Legend:

- Substation Site
- Preferred Route
- Transmission Line
- Parkway Extension
- Rare Species Habitat
- Historic Site
- Archaeological Site
- Buildings
- Highway
- Primary Road
- Secondary Road
- Heritage Road
- Sensitive Streams
- Streams
- Railroad
- Pipeline
- Open Water
- Century Farm
- Wetlands
- Natural Areas
- Floodplain
- Cities
- 300' Archaeological Site Buffer
- 1000' Historic Site Buffer

0 0.5 1 Miles

Tennessee Valley Authority
EDAW, Inc.
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